

1. A nucleic acid molecule comprising a nucleic acid sequence encoding at least one complementary determining region (CDR) of a variable region of an antibody, said antibody specifically interacting with the extracellular domain of the human zeta-chain, said antibody being obtainable by immunizing a rat with Jurkat cells and subsequently with a conjugate comprising a carrier molecule and a peptide comprising the 11 N-terminal amino acids of a the rat zeta-chain.
2. The nucleic acid molecule of claim 1 wherein said nucleic acid molecule comprises a nucleic acid sequence encoding at least two CDRs of said variable region.
3. The nucleic acid molecule of claim 1 or 2, wherein said nucleic acid molecule comprises a nucleic acid sequence encoding three CDRs of said variable region.
4. The nucleic acid molecule of any one of claims 1 to 3 wherein said nucleic acid sequence encodes a V_H chain.
5. The nucleic acid molecule of any one of claims 1 to 3 wherein said nucleic acid sequence encodes a V_L chain.
6. The nucleic acid molecule of any one of claims 1 to 5 which is a DNA molecule.
7. The nucleic acid molecule of any one of claims 1 to 6 wherein said CDR has one of the following nucleotide sequences:
 - (a) SEQ ID No. 1
 - (b) SEQ ID No. 3
 - (c) SEQ ID No. 5
 - (d) SEQ ID No. 7
 - (e) SEQ ID No. 9

(f) SEQ ID No. 11

8. The nucleic acid molecule of claim 4 wherein said V_H-chain has the nucleotide sequence of SEQ ID No. 13 or encodes the amino acid sequence of SEQ ID No. 14.
9. The nucleic acid molecule of claim 5 wherein said V_L-chain has the nucleotide sequence of SEQ ID No. 15 or encodes the amino acid sequence of SEQ ID No. 16.
10. The nucleic acid molecule of any one of claims 1 to 6 wherein the CDR encodes one of the amino acid sequences:
 - (a) SEQ ID No. 2
 - (b) SEQ ID No. 4
 - (c) SEQ ID No. 6
 - (d) SEQ ID No. 8
 - (e) SEQ ID No. 10
 - (f) SEQ ID No. 12
11. A vector comprising the nucleic acid molecule of any one of claims 1 to 10.
12. A host transformed or transfected with the vector of claim 11.
13. A method of producing a (poly)peptide encoded by the nucleic acid molecule of any one of claims 1 to 10 comprising culturing the host of claim 12 under suitable conditions and isolating said (poly)peptide from the culture.
14. A (poly)peptide encoded by the nucleic acid molecule of any of claims 1 to 10 or produced by the method of claim 13.
15. An antibody or fragment or derivative thereof comprising at least one (poly)peptide of claim 14.

16. The antibody of claim 15 which is a monoclonal antibody.
17. The antibody of claim 15 which is a bispecific antibody.
18. The antibody of claim 17 wherein the first specificity is for the extracellular domain of the human zeta-chain on the surface of an intact cell and the second specificity is for an optionally different molecule on the surface of a T-lymphocyte, a natural killer cell or a precursor thereof.
19. The antibody of claim 17 wherein the first specificity is for the extracellular domain of the human zeta-chain on the surface of an intact cell and the second specificity is for a different molecule on the surface of a different cell, preferably a cell different from a T-cell, an NK-cell or a precursor thereof, wherein preferably said different molecule is a virus encoded antigen, a tumor associated antigen or a surface antigen either on antigen presenting cells (APCs), most preferably dendritic cells, or on non-APCs.
20. The derivative of claim 15 which is an scFv chain.
21. The antibody of claim 16 which is an IgM.
22. A bispecific receptor comprising a (poly)peptide of claim 14 and a natural receptor, natural ligand or derivatives thereof interacting with a surface molecule on the same or on another cell, wherein preferably said receptors or ligands are CD4, CTLA-4, B7-1, B7-2, LFA-3, ICAM-1, -2, -3 or chemokines like MIP-1 α , MIP-1 β , RANTES or SDF-1.
23. A pharmaceutical composition comprising the nucleic acid molecule of any of claims 1 to 10, the vector of claim 11, the host of claim 12, the (poly)peptide of claim 14, the antibody or fragment or derivative thereof of any one of claims 15 to 21 and/or the bispecific receptor of claim 22.

24. Use of the antibody of claim 18 for the preparation of a pharmaceutical composition for the treatment or prevention of autoimmune diseases, immune deficiencies, T-cell malignancies, infectious diseases or for the suppression of immune response preferably in order to avoid graft rejection after organ transplantation.
25. Use of the antibody claim 19 for the preparation of a pharmaceutical composition of the treatment or prevention of malignancies, viral infections, or other infectious diseases.
26. Use of the (poly)peptide of claim 14 or the antibody or fragment or derivative thereof of any one of claims 15 to 21 or the bispecific receptor of claim 22 for the preparation of a pharmaceutical composition for the enhancement or suppression of NK-cell dependent immunity or for the treatment of NK-cell derived malignancies.
27. A method for the determination of zeta-chain or eta-chain expression on NK-cells, T-lymphocytes or precursors thereof comprising
 - (a) contacting the (poly)peptide of claim 14 or the antibody or fragment or derivative thereof of any one claims 15 to 21 with said NK-cells, T-lymphocytes or precursors thereof; and
 - (b) assessing the amount of bound (poly)peptide, antibody or derivative.
28. A kit comprising the nucleic acid molecule of any of claims 1 to 10, the vector of claim 11, the host of claim 12, the (poly)peptide of claim 14, the antibody or fragment or derivative thereof of any one of claims 15 to 21 and/or the bispecific receptor of claim 22.
29. A transgenic animal comprising in its germline at least one copy of the nucleic acid molecule of any of claims 1 to 10 or the vector of claim 11.

Abstract

The present invention relates to a nucleic acid molecule comprising a nucleic acid sequence encoding at least one complementary determining region (CDR) of a variable region of an antibody, said antibody specifically interacting with the extracellular domain of the human zeta-chain, said antibody being obtainable by immunizing a rat with Jurkat cells and subsequently with a conjugate comprising a carrier molecule and a peptide comprising the 11 N-terminal amino acids of the rat zeta-chain. Preferably, the (poly)peptide encoded by the nucleic acid molecule of the invention is a monospecific or bispecific antibody. The invention also relates to pharmaceutical compositions comprising i. a. the nucleic acid molecule or antibody of the invention as well as to kits comprising the aforementioned compounds. Finally, the invention relates to a method for the determination of zeta-chain or eta-chain expression on NK-cells, T-cells or precursors thereof employing the antibody of the invention.